

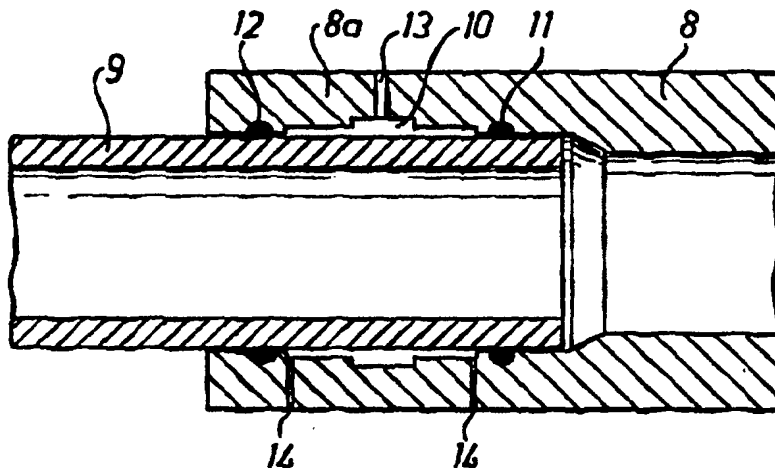


## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<b>(51) International Patent Classification <sup>6</sup> :</b> <b>F16L 13/11</b>	<b>A1</b>	<b>(11) International Publication Number:</b> <b>WO 95/02144</b> <b>(43) International Publication Date:</b> 19 January 1995 (19.01.95)
<b>(21) International Application Number:</b> PCT/SE94/00661 <b>(22) International Filing Date:</b> 5 July 1994 (05.07.94) <b>(30) Priority Data:</b> 9302303-4      5 July 1993 (05.07.93)      SE <b>(71) Applicant (for all designated States except US):</b> BOREALIS INDUSTRIER AB [SE/SE]; S-522 82 Tidaholm (SE). <b>(72) Inventor; and</b> <b>(75) Inventor/Applicant (for US only):</b> DJURNER, Krister [SE/SE]; Enebacksvägen 18, S-522 34 Tidaholm (SE). <b>(74) Agent:</b> AWAPATENT AB; Box 11394, S-404 28 Göteborg (SE).		<b>(81) Designated States:</b> AT, AU, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, ES, FI, GB, GE, HU, JP, KE, KG, KP, KR, KZ, LK, LU, LV, MD, MG, MN, MW, NL, NO, NZ, PL, PT, RO, RU, SD, SE, SI, SK, TJ, TT, UA, US, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).  <b>Published</b> <i>With international search report.</i> <i>In English translation (filed in Swedish).</i>

**(54) Title:** GLUE JOINT AND A JOINT PRODUCTION METHOD**(57) Abstract**

The invention concerns a joint which is formed by gluing two objects (1, 2, 8, 9) together. Intermediate a tubular interconnection portion (3, 8a) of one (1, 8) of the objects, which portion is arranged to be threaded over the other object (2, 9), a delimited cavity (5, 10) is formed. From the exterior of the tubular interconnection portion (3, 8a) extends a first bore (6, 13) into the cavity (5, 10). Glue may be forced into said cavity (5, 10) through said second bore in order to fill said cavity (5, 10) completely. In accordance with a method of forming a glue joint of this kind intermediate two objects (1, 2, 8, 9) a gap forming between the interconnection portion (3, 8a) of the first object (1, 8) and the second object (2, 9) upon interconnection of said objects, is closed so as to form a delimited cavity (5, 10) intermediate the objects (1, 2, 8, 9). Glue is forced through a bore (6, 13) drilled in said interconnection portion (3, 8a) for the purpose of filling said cavity (5, 10) completely.



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GLUE JOINT AND A JOINT PRODUCTION METHOD

The subject invention concerns a joint formed by gluing together two objects at least one of which  
5 comprises a tubular interconnection portion that may be threaded over a portion of the other object.

The traditional manner of joining together objects by means of gluing is to initially apply glue on the relevant surfaces and thereafter to bring the objects into engaging  
10 contact. This is a simple and often satisfactory method. Problems arise, however, when the surfaces to be glued are located on a portion of the object that is intended to be threaded over or into another object. In this situation there is a risk that the glue will be shaved off as the  
15 objects are being assembled into nesting position, and it is often difficult to obtain a joint having a well defined thickness. Examples of applications when this kind of situation may arise are when tubes in tubular systems are to be interconnected or elements in framework construc-  
20 tions.

When tubes in tubular systems are to be interconnected the gluing method is often adopted when the tubes are made from a material that does not lend itself to welding, such as e.g. reinforced thermosetting plastic.  
25 In addition to the time-consuming laminating method, the method used today is based on preparing the tube end in such a manner that one end could be threaded over the other one. Glue is thereafter applied to the contacting surfaces of the ends to be interconnected, whereupon the  
30 two ends are joined together. The problems associated with this method is on the one hand that the glue may be scraped off the contacting surfaces during the very interconnection procedure and on the other that the mounting, from the preparatory steps up to the finished  
35 joint, is time-consuming. The first problem may result in a leaking joint with ensuing impaired durability. In addition, it is difficult to verify whether the glue joint

is intact or not. Furthermore, the method is far from satisfactory from a health point of view since the mounting staff run the risk of being exposed to high concentrations of hazardous substances during work.

5        In the case of framework constructions the adoption of traditional gluing methods for the interconnection of structural elements could, if made possible, make the mounting more efficient and this is true with respect to both weldable and un-weldable materials.

10        The subject invention is based on the realisation that a glue joint should be dimensioned so as to ensure that to the highest possible degree the load absorbed be in the form of shearing strain, i.e. that tensile stress, cleavage stress and split stress be minimized. The  
15        characteristic features of the joint in accordance with the invention are defined in the appended claims 1 - 3.

      The invention also concerns a method of forming a glue joint. The characteristic features of this method are set forth in the appended claims 4 and 5.

20        The invention will be described in closer detail in the following with reference to the accompanying drawings, wherein

      Fig. 1 is a cross-sectional view through two objects chosen to explain the principle of the invention, and

25        Fig. 2 is a cross-sectional view through a coupling member and a tube section when interconnected.

      The principle on which the glue joint in accordance with the invention is based is illustrated in Fig. 1, showing two objects 1 and 2 in the interconnected  
30        position. Object 1 is formed with a tubular or sleeve-like interconnection portion 3 adapted to be threaded over a part of the other object 2. With the aid of a seal 4, such as an O-ring, a well defined cavity 5 is formed between the tubular interconnection portion 3 of object 1 and the  
35        object 2. Via a bore 6 the cavity 5 is in communication with the exterior of the object 1. To the bore 6 may be connected a source of pressurized medium, not shown, and a

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supply of glue, such as e.g. a glue gun. From said glue supply glue is intended to be injected into the cavity 5 when the two objects 1 and 2 have been moved into nesting relationship. The quality of the glue joint is ensured by the fact that the seal 4 prevents the glue from escaping from its intended location.

On the opposite side from the bore 6, the tubular interconnection portion 3 of the object 1 preferably is provided with at least one additional bore 7, the latter primarily serving as a vent hole to facilitate complete filling-out of the cavity 5 with glue. However, the bore 7 is advantageous also in the respect that it provides an indication that the cavity 5 is completely filled, since in this case glue leaks to the exterior from said bore 7.

Fig. 2 shows an embodiment according to which both objects are tubular components 8 and 9. In this case object 8 could be assumed to be a multi-branch coupling member to the branches of which tubes 9 may be connected at different angles. Like in the embodiment of Fig. 1, the cavity could be the gap forming between two objects 8 and 9 after insertion of an object 9 having a smaller external diameter than the inner diameter of the interconnection portion 8a of the object 8. However, it is likewise possible to form a cavity 10 in the inner wall of the interconnection portion 8a of the object 8 by means of milling or by other methods, said cavity being delimited by means of seals 11, 12 on both sides of the cavity 10.

Like in accordance with the embodiment of Fig. 1 a bore 13 is provided through which glue may be forced into the cavity 10. In accordance with this embodiment two bores 14, one on either side of the cavity 10, are drilled on the opposite side from that of bore 13. These bores 14 serve the same purpose as bore 7 in accordance with Fig. 1.

In order to reduce the force necessary to press the glue about the object 9 and in order to ensure that all air leaves the cavity 10, the latter is preferably formed

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with a centre depression as appears from Fig. 2, whereby the glue, while successively filling up the cavity 10, will reach the vent holes 14 last. The shape of the cavity 10, the seals 11, 12 and the strategic position of the vent  
5 holes 14 all contribute to ensuring that the cavity 10 is completely filled with glue when the latter penetrates to the exterior through the vent holes 14.

The invention is not limited to the embodiments described and illustrated in the drawings but could be  
10 modified in a variety of ways within the scope of the appended claims. This is true as regards the configuration of the cavities 5, 10 as well as the number of bores 6, 13 and 7, 14, respectively. Also the seals 4 and 11, 12 could be of a different nature.

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CLAIMS

1. A joint formed by gluing together two objects (1, 2, 8, 9) at least one (1, 8) of which comprises a tubular interconnection portion (3, 8a) that may be threaded over the other object (2, 9), c h a r a c - t e r i z e d in that a delimited cavity (5, 10) is formed between said object (2, 9) and the tubular interconnection portion (3, 8a) of the first object (1, 8), and in that a first bore (6, 13) extends from the external face of said tubular interconnection portion (3, 8a) to said cavity, through which first bore (6, 13) glue may be forced into said cavity (5, 10).
2. A joint as claimed in claim 1, c h a r a c - t e r i z e d in that said cavity (5, 10) is delimited by means of stop means, preferably annular seals (4, 11, 12).
3. A joint as claimed in any one of the preceding claims, c h a r a c t e r i z e d in that a second bore (7, 14) is provided on the tubular interconnection portion (3, 8a) on the opposite side from that of the first bore (6, 13), said second bore serving to allow escape of glue when the cavity (5, 10) is completely filled.
4. A method of forming a joint in accordance with claim 1 by gluing together two objects (1, 2, 8, 9), at least one (1, 8) of which is tubular in the area of the interconnection portion (3, 8a) and is arranged to be threaded onto the other object (2, 9) by means of said portion (3, 8a), c h a r a c t e r i z e d by closing a gap formed between said tubular interconnection portion (3, 8a) and said other object (2, 9) as said tubular portion is being threaded onto the latter, for the purpose of creating a delimited cavity (5, 10) intermediate the objects (1, 2, 8, 9), and by forcing glue through a first bore (6, 13) formed in the tubular interconnection portion (3, 8a) for the purpose of filling out said cavity (5, 10) with glue.

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5. A method as claimed in claim 4, wherein said tubular interconnection portion (3, 8a) is provided on its side opposite to said first bore (6, 13) with at least one second bore (7, 14), c h a r a c t e r i z e d in that  
5 glue is forced through said first bore (6, 13) in a sufficient amount to ensure that glue, once it has filled the cavity (5, 10), penetrates to the exterior through the second bore (7, 14).

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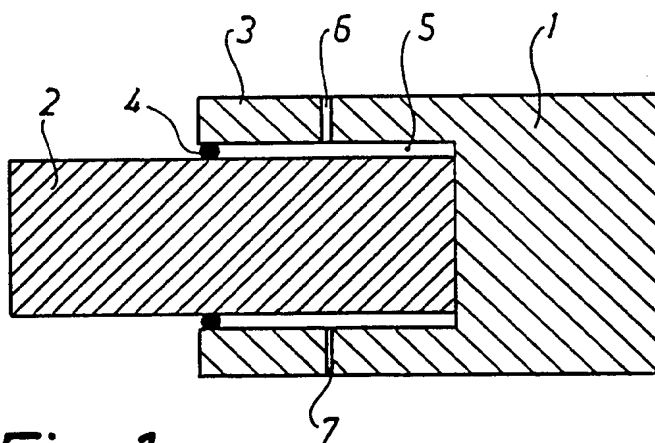


Fig. 1

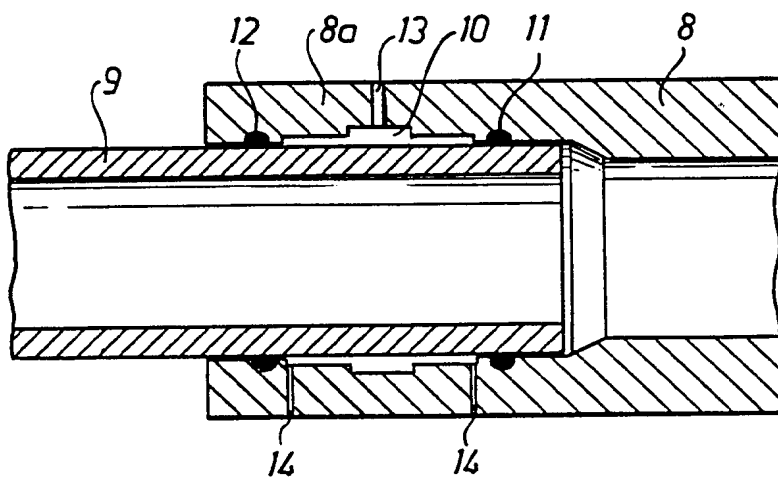


Fig. 2

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 94/00661

## A. CLASSIFICATION OF SUBJECT MATTER

IPC : F16L 13/11

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC : F16L, C09J

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPI, EPODOC

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP, A1, 0164261 (BRITISH GAS CORPORATION), 11 December 1985 (11.12.85), page 3, line 9 - line 13, figure 4, abstract  -----	1-5

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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Date of the actual completion of the international search

17 October 1994

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# INTERNATIONAL SEARCH REPORT

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP-A1- 0164261	11/12/85	CA-A- 1249114	24/01/89
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		GB-A- 2159906	11/12/85
		US-A- 4673449	16/06/87